Teaching Statement

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As a teacher I strive to instill into my students two skills that, I am convinced, are critical for success regardless of the career path they follow after their college education: problem solving and disciplined thinking. I believe that a mathematics classroom provides the ideal environment to help the students build up strength in these aspects to an extent that goes beyond the particular mathematical subject being taught.

I always make sure to demonstrate to my students that, in order to be successful in mathematics, proficiency with formulas and calculations is only one of several ingredients. I show them how, as they approach a problem, be that in math or anything else, they must be able to isolate the key concepts and then determine a strategy that allows them to use their existing knowledge and tools to successfully come up with a solution. It is the internalization of this structured thought process what is truly valuable and will have positive impact on the development of the student.

My preferred approach to demonstrate this is the use of “word problems,” where I show my students how to turn a seemingly complicated skein of words and variables into mathematical statements where they can use the methods and procedures that they have learned before. While doing this, I stress that behind the haze of calculations there are only a few important ideas involved that play a key role in the final solution and that, once identified, serve as a guiding thread.

Teaching how to break down a problem into its basic elements and then showing how to use previously acquired knowledge to deal with each of the parts is, in my opinion, one of the strong points of my approach, and one that can certainly help the students inside and outside the realm of mathematics. Once they have seen this process exemplified a few times they feel much more comfortable with their own ability to address a problem and to apply the technique out of the classroom.

I am convinced that students need to be challenged in order to make the best of their learning experience. When gently forced out of their comfort zone, students take active part in the learning process, engage in group discussion and collaborative learning and, with the appropriate positive feedback from the instructor, they get a boost in self confidence and a sense of empowerment. When done this way, students realize that learning is in fact a very rewarding experience.

Over the years I have had the opportunity to teach courses in subjects ranging from high school algebra to graduate level mathematics and also in the applied sciences: geological and atmospheric sciences, biological applications of mathematics, and physics. This has had a positive impact on my approach to teaching, giving me a broader perspective as to what the needs and expectations of non-specialist college students are. It has also provided me with a variety of practical examples and the capability to make analogies between different disciplines.

A vital ingredient for successful learning is the creation of a friendly and comfortable atmosphere where students feel free to brainstorm and try different approaches, ask questions and participate continuously. One of the ways in which I try to achieve this is by presenting myself
not as someone who is above them and pontificates, but rather as someone who walks them through their own learning process facilitating it and guiding them along the way. I am also very open to student’s suggestions and concerns and try to incorporate them into my teaching, adapting—within reasonable limits—the course to fit their needs.

My approach is usually welcome by the students, and I’ve received positive and encouraging comments from them. I quote just a few examples:

- *Tonatiuh explains things in a much clearer manner and makes understanding the concepts a lot easier. He answers questions effectively and is helpful if you approach him with questions.*
- *Very easy to learn from. Provides clear examples. Open and honest about what he expects from us.*
- *Tonatiuh is the best, always clear and willing to help. I applaud his enthusiasm for teaching!*
- *Great T.A., always asks for questions and answers them. He is one of our friends who teaches at the front, it seems like. We learn a lot.*
- *Tonatiuh is an awesome teacher, explains the topic with examples, real-life solutions, and is open to questions. He thoroughly explains what was explained during lecture.*

I consistently rank at the top of the student evaluations, being nominated in 2012 for a University-wide “excellence in teaching award”, and in 2015 I was selected to conduct an orientation for incoming Teaching Assistants in mathematical, computer and statistical sciences.

During my doctoral studies I also had the opportunity to explore a different aspect of the teaching process by mentoring Matthew Moye, an undergraduate student who undertook ten weeks of summer research and then an independent research course in the subsequent semester. The project was coordinated by Prof. Tobin Driscoll and its goal was to implement computationally an algorithm to solve first order non linear partial differential equations related to conservation laws. This required me first to assess the background knowledge of my student and tailor a crash-course that brought him to the point where he could start working independently.

I decided to select a few reading materials for him and meet three or four times a week to go over the material and clarify the details. After this initial stage, we went over programming standards and the way in which he was expected to produce and present his own code, and then he was ready to work on his own, meeting only once or twice a week to check on the progress. In the end, Matt presented his work on undergraduate research conferences and I had the chance to present the results in a poster at the University of Oxford in September, 2013. After his graduation from the University of Delaware, Matt went on to pursue graduate studies in applied mathematics at the New Jersey Institute of Technology. The whole experience was very positive for me and reinforced my desire to mentor undergraduate and graduate research in the future.

Summarizing, I think that the learning process in a mathematics classroom must be a collaborative effort, where the student puts the effort and the energy, and the instructor guides and facilitates the assimilation of concepts and techniques in a unified, cohesive manner. My goal is not only to teach mathematical concepts, but rather to use them as the key to unlock in my students analytic and reasoning skills that will prove useful in ways that transcend a University classroom. Teaching has always been an enriching part of my life and I am sure it will continue to be so in the foreseeable future.